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Black Walnut

Forest Service

U. S. DEPARTMENT OF AGRICULTURE

BLACK WALNUT

(*Juglans nigra*)

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Black walnut, although cut in small quantities in comparison with many of the hardwoods such as oak, sweetgum, and maple, is one of the best known and most valuable of the forest trees native to the United States. Its dark-colored, handsomely grained wood is well adapted to fine cabinet work and interior finish both in the form of solid wood and as a face veneer; it has long been the standard wood for gunstocks; its nuts furnish a food product; and, under favorable conditions, the trees are highly effective for ornamental use. The botanical range of black walnut covers most of the eastern half of the United States. It grows best in valleys and bottom lands where there is a rich, moist soil. The wood is strong, hard, and durable, is easily worked with tools, holds its shape well after seasoning, and can be readily polished to accentuate the beauty of the grain. Stumps that contain figured wood are used as a source of veneer which frequently shows intricate and beautiful patterns. Other parts of the tree may also yield figured as well as plain veneer.

The use of black walnut timber began in early colonial times. Probably its first extensive use was for fence rails because it was easy to split and resisted decay. Much black walnut was cut for fuel. Much was wasted in clearing land for cultivation. Its popularity as a wood for cabinet work and for gunstocks began in the eighteenth century. The Civil War and World War I both caused heavy demands on black walnut for gunstocks. In World War I black walnut was also in demand for airplane propellers. The country was searched for material suitable for these wartime uses and unexpectedly large quantities were found available. World War II has again caused heavy demands on black walnut for gunstocks.

Black walnut timber has never been plentiful in the sense that large amounts were available in any one locality, and it has been repeatedly predicted that the supply would soon be exhausted. The cut in normal times, however, is comparatively small and, while the original supply has undoubtedly been markedly reduced, demands have continued to be met. A moderate but fairly steady supply seems assured because of the wide distribution of the tree, its rapid growth, and the continued scattered planting, especially in farmers' wood lots, which contain an increasing proportion of the supply. In normal times some of the cut of black walnut is exported in the form of lumber and logs with occasional shipments of veneer.

Nomenclature.—Black walnut is often called American walnut or simply walnut. Less frequently it is known as American black walnut and occasionally as "gun-wood."

Distribution and growth.—Black walnut grows naturally over a large area extending from Vermont westward into Nebraska and southward to southern Georgia and southern Texas (fig. 1). The area of greatest commercial production is limited to the central portion of the natural range. Black walnut grows best in soil that is

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rich, moist, and deep but well-drained. It does not often grow at the higher elevations within its range or on wet bottom lands.

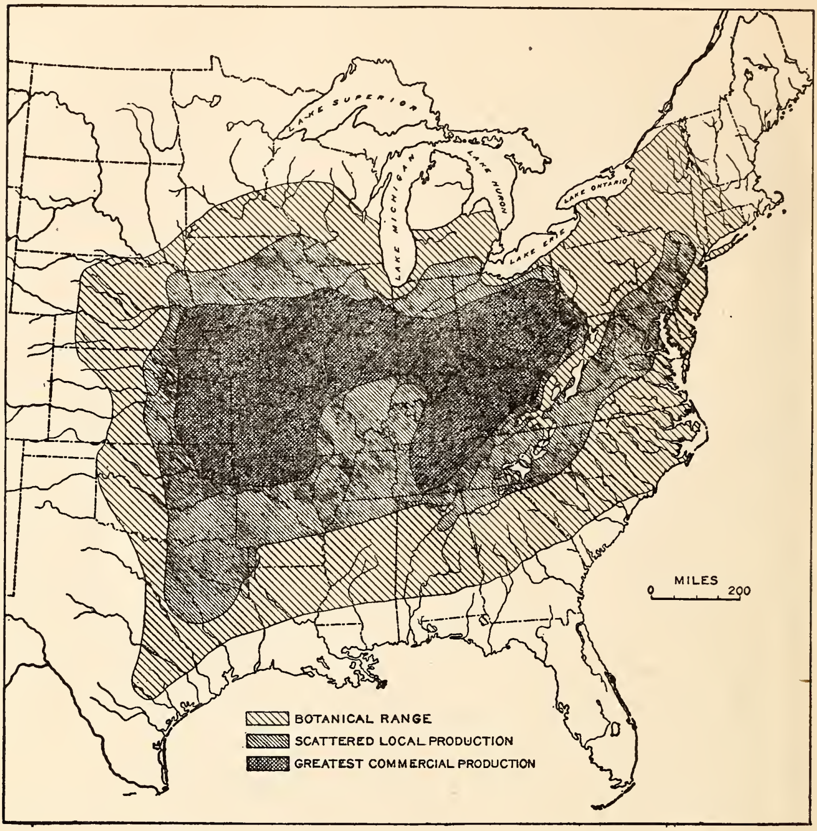

FIGURE 1.—Range of black walnut (*Juglans nigra*).

It is found in three characteristic situations—as scattered field and fence-corner trees, as scattered trees in hardwood stands, and in pure stands of limited extent, usually on the edge of the hardwood forest. Black walnut is decidedly intolerant of shade except for the first few years of its life.

Black walnut is naturally a large tree. Logs as much as 77 inches in diameter at the small end and trees 150 feet in height are on record. However, on account of the demand for the lumber, trees 30 inches in diameter breast high and 100 feet in height are now rare.

The nut crops are usually generous, and the percentage of fertility is high. The mature nuts are round and about 2 inches in diameter outside the husk that encloses them. The planting of forest-grown black walnut has been done largely by squirrels carrying the nuts from beneath the trees and burying them at a distance for future use. Sprout reproduction occurs, but rarely produces a good tree of saw-log size. Reproduction is rare in stands open to cattle and hogs.

Black walnut is classed among the more rapid-growing hardwoods. In closely planted stands trees 12 years old reach an average height of 27 feet and an average diameter (breast high) of 3.8 inches; trees 25 years old, an average height of 42 feet and a diameter of 6.3 inches, and trees 42 years old, 66 feet and 12.3 inches, respectively.

Black walnut trees are moderately free from attack by rot-producing fungi and insects. Some red butt rot is found, generally in northern trees, and some white top rot, generally in southern trees. A tent caterpillar often attacks the foliage of roadside trees but is rare in groves or in the forest.

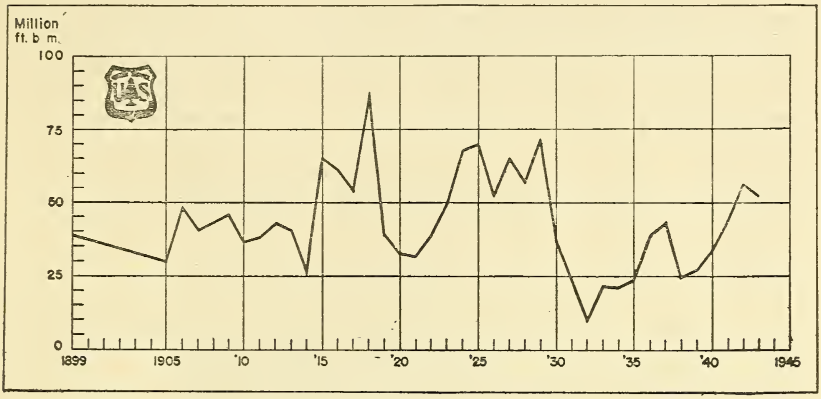

FIGURE 2.—Lumber production of black walnut (*Juglans nigra*), 1899–1943.

Production of lumber.—The cut of black walnut lumber increased irregularly from 38,681,000 board feet in 1899[1] to a maximum of 87,305,000 board feet in 1918 (fig. 2). Since then the reported cut has varied from 71,523,000 feet in 1929 to an all-time low of 9,155,000 feet in the depression year of 1932. In 1942 production was 56,248,000 feet. It came from 30 States. The production in 1943 was 52,337,000 board feet. The marked rise in the reported annual production figures for black walnut lumber in the last few years is due in part to the increased demand for gunstocks brought about by the war, and in part to the more complete coverage of sawmills in the collection of production figures. The average annual reported cut for the 10-year period 1933–1942 was 33,400,000 board feet.[2] Indiana, Ohio, and Missouri have been the three most consistent leaders in the production of black walnut lumber. Other States which have occasionally ranked first are Kansas, Iowa, and Kentucky. In 1942 the three leading States were Missouri, Indiana, and Kansas. These three States supplied approximately 45 percent of the black walnut cut for lumber during that year.

Veneer.—The amount of black walnut used for veneer increased from 1,725,000 feet log scale in 1905[3] to a maximum of 26,893,000 feet in 1929. In 1931 consumption dropped to 8,524,000 feet because of adverse business conditions. In 1939[4] it was 11,880,000 feet. The average annual consumption of black walnut for veneer during the period 1935–1939[5] was 12,896,000 board feet log scale, equivalent to approximately 15,000,000 board feet of lumber.[6] In 1943 and 1944 the consumption for veneer was 3,542,000 and 7,667,000 board feet, log scale, respectively.

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[1] The first year for which statistics of the Bureau of the Census on black walnut lumber are available. Earlier estimates give a maximum production of 125,000,000 board feet in 1875.

[2] This figure is undoubtedly much smaller than it should be. Probably twice the figure given would be closer to the actual average cut.

[3] The earliest year for which statistics of the Bureau of the Census list the quantity of black walnut used for veneer.

Comparatively small quantities of black walnut go into railroad ties, fense posts, and fuel wood. The average annual cut of black walnut in recent years for all purposes is roughly estimated at 65,000,000 board feet.

Supply.—No estimates of the stand of black walnut are available based on forest surveys of the States which produce the greater part of the black walnut lumber. Such estimates as have been made are general approximations based on the best available evidence and subject to correction when more definite figures are secured from intensive forest surveys.

In 1920 the total stand of black walnut was estimated at 821,000,000 board feet.[7] This estimate covered the timber[8] scattered through 28 States and placed Missouri first in amount of standing timber. Next in order were Illinois, Kansas, and Ohio. These four States were estimated to contain nearly 40 percent of the total stand of black walnut.

A recent estimate made in 1942[9] places the total stand of black walnut timber at 900,000,000 board feet and gives Kansas, Kentucky, and Indiana as the three leading States. Eight States (Kansas, Kentucky, Indiana, Ohio, Iowa, Missouri, Illinois, and Nebraska) are estimated to contain about 70 percent of the total stand.

A comparison of the 1920 and 1942 estimates and consideration of the total amount of black walnut lumber reported as produced during the period between the two estimates,[10] together with recognition of the possible growth, indicates that the earlier estimate was much too conservative and that the 1942 estimate is still too small.

Properties.—The heartwood of black walnut varies in color from light to dark brown. The sapwood is nearly white. Forest-grown trees generally have dark-colored heartwood and a narrow band of sapwood not over 1 inch in width. In open-grown trees the heartwood is generally lighter in color and the sapwood about 3 inches in width. It is common practice to darken the sapwood by steaming or staining to match the heartwood. The annual rings of growth are marked by the presence of many pores at the beginning of each year's growth and by denser growth at the end of the season. The wood frequently contains alternate light and dark stripes which produce figured effects in boards and veneer. Wavy or curly grain near knots, abnormal or irregular growth, crooks, forks, burl, stumpwood, etc., also result in a variety of handsome figures. Burls[11] from very old trees have a bird's-eye figure on a glossy dark groundwork ranging from almost jet black to lighter shades of brown. This gives them an extravagant value. Black walnut is heavy,[12] hard, strong, and stiff. It has good shock-resisting ability, can be satisfactorily kiln-dried or air-dried, takes and holds paint, stain, and other finishes exceptionally well, and can be readily polished. Black walnut is normally straight-grained, easily worked with tools, shrinks and swells very little after being seasoned, and glues well. In durability under conditions favorable to decay the heartwood of black walnut ranks with the most durable woods, including the cedars, chestnut, and black locust.

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[4] The latest year for which statistics on black walnut veneer are available.

[5] Years averaged—1935, 1937, and 1939.

[6] The overrun of log scale over lumber scale is considered to be 20 percent.

[7] See "Black Walnut—Its Growth and Management," by F. S. Baker, Forest Service. Published as U. S. Department of Agriculture Bulletin No. 933.

[8] 12 inches and over in diameter breast high.

[9] Based on information obtained from Forest Experiment Stations of the U. S. Forest Service and from State forestry organizations.

[10] The total reported production of black walnut lumber for the period 1921–1942 was over 850,000,000 board feet. This total is undoubtedly considerably less than was actually cut because of the incomplete coverage of the sawmills that produced black walnut lumber.

[11] An abnormal growth of wood tissue.

Principal uses.—The outstanding use of black walnut is for furniture. Other important uses are for radio and phonograph cabinets, sewing machines, gunstocks, and interior finish. It is used either in the form of solid wood cut from lumber or in the form of plywood made by gluing sheets of plain or figured veneer to both sides of a core. Intermediate sheets (cross bands) are often used between the faces and core to form five-ply cross-banded plywood. In all cases the direction of the grain in the various layers or plies is at right angles to the grain in the adjacent ply or plies. A common thickness of black walnut face veneer is one twenty-eighth of an inch. The core and intermediate plies are commonly made of less expensive woods such as basswood or yellow-poplar. Cores vary in thickness. They may be veneer or they may be lumber one-fourth inch thick and up. Black walnut veneer is made by the slicing method and to a limited extent by the rotary-cut method. In the former a thick slab (flitch) sawed from the log is clamped to a movable bed which slides up and down in diagonal guides. The flitch is sliced into veneer with a heavy adjustable knife which is advanced after each cut. In the rotary-cut method the log is revolved against a constantly advancing knife. Black walnut veneer is occasionally made by sawing.

Black walnut furniture is made principally for dining rooms and bedrooms. Dining room tables of black walnut stand up especially well under the hard usage such tables often get. Bookcases, desks, living-room tables, and many other pieces are also frequently made of walnut. Recently the wood has been in demand for office furniture. It is widely used in all kinds and classes of radio and phonograph cabinets. For the highest grade cabinets, plywood panels, faced with figured material, are used. Walnut musical instruments include piano cases. For interior finish in cafes and public buildings where striking effects are called for, walnut is very popular. The wood is particularly suitable for gunstocks on account of its ability to stay in place after seasoning, its fine machining properties, its uniformity of texture combined with a slight coarseness which renders it easily gripped and held by the hand, and its sufficient strength and shock-resisting ability without excessive weight. Figured black walnut stocks are used for the more expensive shotguns and sporting rifles.

In addition to the black walnut used for lumber and veneer products limited quantities go into railway ties, fence posts, and fuel wood.

The nuts of black walnut have long been used as an article of food—principally in candy making and more recently in breads and cakes. The shells are thick and the kernels difficult to extract. Usually the kernel parts are taken out in quarter pieces or smaller.

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[12] The average weight of black walnut in a thoroughly air-dry condition (12 percent moisture) is 39 pounds per cubic foot.

Table 1 shows the amounts of black walnut used in the manufacture of wooden products in 1912, 1928, 1933, and 1940. The figures include black walnut in the form of lumber, veneer, and logs and bolts.

TABLE 1.—*Black walnut used in the manufacture of wooden products*

[Thousands of board feet]

Classes of products	1912	1928	1933	1940
Airplanes	---	76	6	---
Agricultural implements	8	---	---	---
Boxes, baskets, and crating	163	89	15	303
Boxes, cigar and tobacco	---	---	---	17
Car construction and repair	256	65	35	19
Caskets and burial boxes	474	934	1,309	720
Dairy, poultry and apiary supplies	(1)	---	---	---
Electrical equipment	453	44	57	---
Firearms	1,700	1,052	2,827	776
Fixtures	661	7,867	2,396	1,758
Flooring	(2)	(2)	229	496
Furniture	1,953	51,358	17,818	22,715
Handles	56	150	64	575
Instruments, musical	4,992	4,135	195	492
Instruments, professional and scientific	71	27	14	20
Laundry appliances	20	---	---	---
Machinery	11	---	---	18
Patterns and flasks	22	6	100	6
Pipes, tobacco	---	---	---	121
Plumbers' woodwork	10	---	---	---
Printing material	---	15	---	---
Radio and phonograph cabinets	(3)	(3)	900	2,877
Refrigerators	---	5	10	---
Rollers, shade and map	2	---	---	---
Sash, doors, general millwork	[4] 4,731	[4] 8,591	[5] 786	[5] 1,261
Sewing machines	7,797	2,590	832	2,480
Ship and boat building	4	76	54	1
Shuttles, spools, bobbins, looms	(6)	(6)	(6)	1
Signs, scenery, displays	---	---	---	45
Sporting and athletic goods	41	488	47	171
Toys	---	136	60	257
Trunks and valises	---	---	---	15
Vehicles, motor	(7)	409	57	---
Vehicles, nonmotor	390	---	---	---
Woodenware and novelties	173	98	113	817
Total	23,988	78,211	27,924	[8] 35,961

[1] Included in "Woodenware and novelties."
[2] Included in "Sash, doors, general millwork."
[3] Included in "Furniture."
[4] Includes planing-mill products such as flooring, ceiling, and siding.
[5] Planing-mill products not included in 1933 and 1940 canvasses except flooring, which is listed separately.
[6] Does not include looms.
[7] Included in "Vehicles, nonmotor."
[8] This figure includes 27,646,000 board feet of lumber, an amount of veneer equivalent to 8,312,000 board feet, and 3,000 board feet of logs and bolts.

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